

**REMARKS**

**Claims:**

Claims 3-7, 9-13, 16-19, 22-25 and 27-30 comprise the case, Claims 1-2, 8, 14-15, 20-21 and 26 having been cancelled.

Claims 3, 9, 16, 22 and 27 have been amended to be in independent form, incorporating the language of one or more claims from which they formerly depended.

Claims 3-7, 9-13 and 27-30 have been amended to incorporate the language "configured to" and to provide grammatically correct language associated therewith.

Applicants respectfully submit that no new matter has been added.

**35 USC § 102:**

Claims 3-7, 9-13, 16-19, 22-25 and 27-30 stand rejected under 35 U.S.C. § 102(e) as "being anticipated by Meiri et al.; US PG Pub 2004/0193816."

Meiri et al. discusses a storage device in which a "All of the writes performed by the host 22 that are assigned sequence number N are collected in a single chunk of data 52. \*\*\* Generally, the local storage device 24 accumulates chunks of one sequence number while transmitting a previously accumulated chunk (having the previous sequence number) to the remote storage device 26. A chunk 54 represents writes from the host 22 that were assigned the sequence number N-1 that have not been transmitted yet to the remote storage device 26. The remote storage device 26 receives the data from the chunk 54 corresponding to writes assigned a sequence number N-1 and constructs a new chunk 56 of host writes having sequence number N-1. \*\*\* Generally, once a chunk corresponding to a particular sequence number is committed, that chunk may be written to the logical storage device. This is illustrated in FIG. 2 with chunk 58 corresponding to

writes assigned sequence number N-2 \*\*\*." (Paragraph 0046, line 6 -- paragraph 0048, line 15)

Applicants respectfully request reconsideration of the rejection with respect to Claims 3-7, 9-13, 16-19, 22-25 and 27-30 on several grounds.

1. Meiri et al. makes no provision for updates during the transfer, to which Applicants' claims are directed.

Meiri et al. processes data based on sequence numbers as per the above, and only transfers the original data to the remote storage device, at various steps locking access to the data, without provision for updates to the data occurring during the transfer. Rather, Meiri et al. may optionally transmit portions of the data that are found to have been changed since the last transfer (See paragraph 0071, lines 1 to 10).

Thus, Applicants respectfully submit that Meiri et al. specifically teaches away from Applicants' invention, for example, of Claim 3, "source data storage configured to store and update data; first intermediate data storage configured to store data, said first intermediate data storage associated with said source data storage; target data storage configured to store data; second intermediate data storage configured to store data, said second intermediate data storage associated with said target data storage; and mirroring control configured to conduct first cyclic incremental flashcopy of said source data storage, the beginning of each said first cyclic incremental flashcopy comprising a consistency point, said first cyclic incremental flashcopy copied to said first intermediate data storage and synchronously mirrored to said second intermediate data storage; and to conduct a second cyclic incremental flashcopy of said second intermediate data storage to said target data storage, said second cyclic incremental flashcopy beginning in response to completion of said first cyclic incremental flashcopy; the beginning of said second cyclic incremental flashcopy comprising commit of said consistency point; wherein said mirroring control additionally comprises a loop representing said commit of said consistency point, initiating another first cyclic incremental flashcopy of said source data

storage in response to said commit of said consistency point; wherein said mirroring control additionally is configured to respond to an update write for said source data storage, to determine whether data of said source data storage to be overwritten by said update write is present at said first intermediate data storage and said second intermediate data storage; if so, to allow said update write to be written to said source data storage, and to indicate said update write in a future flashcopy map." (Emphasis added).

2. Meiri et al. teaches away from Applicants' "future flashcopy map".

Meiri et al. provides "Two linked lists of pointers 74, 76 are used in connection with the standard logical device 72. \*\*\* Each of the linked lists 74, 76 may be used for one of the chunks of data 52, 54 so that for example, the linked list 74 may correspond to the chunk of data 52 for sequence number N while the linked list 76 may correspond to the chunk of data 54 for sequence number N-1." (Paragraph 0052, line 1 -- paragraph 0053, line 5).

Thus, Applicants respectfully submit that the linked lists of Meiri et al. specifically teach away from Applicants' claims. for example, Claim 3 "wherein said mirroring control additionally is configured to respond to an update write for said source data storage, to determine whether data of said source data storage to be overwritten by said update write is present at said first intermediate data storage and said second intermediate data storage; if so, to allow said update write to be written to said source data storage, and to indicate said update write in a future flashcopy map." (Emphasis added).

3. Meiri et al. teaches away from Applicants' "loop".

In Meiri et al., "When the remote storage device 26 has received all of the data from the chunk 54, the local storage device 24 sends a commit message to the remote storage device 26 to commit all the data assigned the N-1 sequence number corresponding to the chunk 56. Generally, once a chunk corresponding to a particular sequence number is committed, that chunk may be written to the logical storage device."

(Paragraph 0048, lines 6-13) (Emphasis added). This is the process of sending a message forward to the remote storage device and not a loop.

Applicants respectfully submit that this teaches away from Applicants' claims, for example, Claim 3, "mirroring control configured to conduct first cyclic incremental flashcopy of said source data storage, the beginning of each said first cyclic incremental flashcopy comprising a consistency point, said first cyclic incremental flashcopy copied to said first intermediate data storage and synchronously mirrored to said second intermediate data storage; and to conduct a second cyclic incremental flashcopy of said second intermediate data storage to said target data storage, said second cyclic incremental flashcopy beginning in response to completion of said first cyclic incremental flashcopy; the beginning of said second cyclic incremental flashcopy comprising commit of said consistency point; wherein said mirroring control additionally comprises a loop representing said commit of said consistency point, initiating another first cyclic incremental flashcopy of said source data storage in response to said commit of said consistency point". (Emphasis added).

Claims 3-7, 9-13, 16-19, 22-25 and 27-30

Independent Claims 9, 16, 22 and 27 correspond to discussed Claim 3 and are similarly distinguished from Meiri et al. Claims 4-7, 10-13, 17-19, 23-25 and 26-30 each depends from Claims 3, 9, 16, 22 or 27 and is similarly distinguished from Meiri et al.

Allowance of independent Claims 3, 9, 16, 22 and 27 and allowance of dependent Claims 4-7, 10-13, 17-19, 23-25 and 26-30 is therefore respectfully requested under 35 U.S.C. § 102(e).

Dependent Claims:

Claims 4, 10, 17, 23 and 28

As discussed above, Meiri et al. teaches away from Applicants' "future flashcopy map".

Applicants' Claims 4, 10, 17, 23 and 28, for example Claim 4, concern "wherein said mirroring control is configured to employ said future flashcopy map for conducting the next first cyclic incremental flashcopy of said source data storage."

Applicants therefore respectfully submit that Claims 4, 10, 17, 23 and 28 are patentable over Meiri et al. under 35 U.S.C. § 102(e).

Claims 5, 11, 18, 24 and 29

As discussed above, Meiri et al. teaches away from Applicants' "future flashcopy map".

Applicants' Claims 5, 11, 18, 24 and 29, for example Claim 5, concern "wherein said mirroring control is configured to conduct said first cyclic incremental flashcopy employing a first flashcopy map indicating required, and not completed, mirroring of grains of said source data storage, and, said mirroring control is configured to, in response to completion of mirroring of said grains indicated by said commit of said consistency point, update said first flashcopy map with said future flashcopy map."

Applicants therefore respectfully submit that Claims 5, 11, 18, 24 and 29 are patentable over Meiri et al. under 35 U.S.C. § 102(e).

Claims 6, 12, 19, 25 and 30

As discussed above, Meiri et al. teaches away from Applicants' "future flashcopy map".

Applicants' Claims 6, 12, 19, 25 and 30, for example Claim 6, concern "wherein said mirroring control is configured to conduct said first cyclic incremental flashcopy employing a first flashcopy map indicating required, and not completed, mirroring of grains of said source data storage, and, said mirroring control is configured to merge said first flashcopy map with said future flashcopy map to generate a new first flashcopy map, and resets said future flashcopy map; the beginning of a new first cyclic incremental flashcopy comprising a consistency point."

Applicants therefore respectfully submit that Claims 6, 12, 19, 25 and 30 are patentable over Meiri et al. under 35 U.S.C. § 102(e).

Claims 7 and 13

Claims 7 and 13 define "wherein said target data storage and said second intermediate data storage are remotely located with respect to locally located said source data storage and said first intermediate data storage; and additionally comprising at least one interface at said target data storage and said second intermediate data storage; and at least one interface at said source data storage and said first intermediate data storage; said interfaces configured to interface with communication systems for communicating between said remote and local locations."

Meiri et al. is submitted to define a system wherein the structure is configured to teach away from Applicants' invention as discussed above.

Therefore, Applicants respectfully submit that the more detailed structure of Claims 7 and 13 also define over Meiri et al. and respectfully submit that Claims 7 and 13 are patentable over Meiri et al. under 35 U.S.C. § 102(e).


Cited Materials:

Applicants respectfully submit that Claims 3-7, 9-13, 16-19, 22-25 and 27-30 are patentable over the additional materials cited by the Examiner under 35 U.S.C. 102 and 35 U.S.C. 103. The Examiner cited USPN 6,611,901, Micka et al.; USPN 7,000,145, Werner et al.; USPN 7,120,769, Yagawa et al.; USPAP 2004/0260898, Stanley et al.; USPAP 2004/0260899, Kern et al.; and USPAP 2006/0085610, Iwamura et al.

Accordingly, Applicants believe the present invention distinguishes over the cited patents and respectfully requests that the Examiner allow Applicants' Claims 3-7, 9-13, 16-19, 22-25 and 27-30, and pass the case to issue.

Respectfully submitted,  
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